



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|---------------------|------------------|
| 10/002,176 | 12/05/2001 | Sam Yang | M4065.0210-/P210-A | 3795 |
| 24998 | 7590 | 10/05/2004 | EXAMINER | |
| DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP | | | TRINH, HOA B | |
| 2101 L STREET NW | | | ART UNIT | PAPER NUMBER |
| WASHINGTON, DC 20037-1526 | | | 2814 | |

DATE MAILED: 10/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-----------------|--------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/002,176 | YANG ET AL. | |
| | Examiner | Art Unit | |
| | Vikki H Trinh | 2814 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 September 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 32-68 and 97 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 32-68 and 97 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s). _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Request for Continued Examination

1. The request for continued Examination (RCE) filed on 09/15/04 under 37 CFR 1.114 is acceptable and a RCE has been established. An action on the RCE follows.

Claim Objections

1. Claim 32 and 56 are objected to because of the following informalities: In claim 32, line 8, “ a top conducting” should be “the top conducting” because applicant appears to refer back to “a top conducting” layer in line 6 of claim 32; and in claim 56, the step, as claimed, does not narrow the independent claim 32. Appropriate correction is required.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 32-61, 64-68, 97 are rejected under 35 U.S.C. 102(e) as being anticipated by Narwankar et al. (6,475,854).

Narwankar et al. (6,475,854) discloses a method of forming a capacitor in a semiconductor device , the method including the steps of:

Art Unit: 2814

With respect to claims 32, 56-61, 64-68, 97, forming a bottom conducting layer 909, 602, 604, 605 forming a dielectric layer 912, 606 over the bottom conducting layer, forming a top conducting layer 608, 610 and annealing the entire top conducting layer with an oxidizing gas anneal/ultraviolet/plasma enhanced at 200-800 degrees Celsius, 2 torr at 15 seconds to 10 minutes, 01-10 liters per second of oxygen gas. See col. 12, table 1, col. 10, lines 15-40, col. 11, lines 4-50. Note that reference numbers 608 and 610 refer to the same layer at different time in the process, as stated in the disclosure of the '854 reference. In particular, after the top conducting layer 608 goes through the annealing step, the top conducting layer 608 becomes the annealed top conducting layer 610. Also note that Narwankar et al. teaches that the capacitor may have one bottom conducting layer, a dielectric layer formed on the bottom conducting layer, and one top conducting layer (see col. 13, lines 24-26).

As to claim 33, the capacitor is formed over a conductive plug 908, the steps further includes depositing an oxygen barrier /insulator 912 over the plug prior to forming the bottom conducting layer 909. See figures 3-6 and column 6, lines 44-45.

As to claim 34, the steps include annealing the dielectric layer 912. See col. 15, lines 25-30.

As to claims 35-41, 48-55, the bottom and top conducting layers are made from Pt or Rh. See col. 12, table I.

As to claims 42-46, the dielectric layer is made of Ta_2O_5 or BST, which has a high dielectric constant of over 10 which is within the claimed range. See col. 12, table I.

As to claim 47, the amorphous dielectric layer is heated to a temperature of over 200 degrees Celsius to change the layer to crystalline. See col. 12, Table I.

Art Unit: 2814

As to claim 49-55, the top and the bottom conducting layer is a noble metal (Pt, Ru, RuO). See col. 12, Table I, col 15 ,lines 45-50.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 62-63 rejected under 35 U.S.C. 103(a) as being unpatentable over Narwankar et al. (6,475,854).

Narwankar et al. (6,475,854) discloses the invention substantially as claimed. However, Narwankar et al. (6,475,854) does not explicitly state the ranges of 400-750 degrees Celsius and 300-800 degrees Celsius for the temperature of the heating treatment. Nonetheless, it would have been obvious to one skilled in the art at the time the invention was made to modify the temperature range (200-800 degrees Celsius) of Redwing with 400-750 degrees Celsius and 300-800 degrees Celsius, respectively, since it is prima facie obvious to an artisan experimentation and optimization because applicant has not yet established any criticality for those specific ranges.

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. (In re Woodruff, 919 F.2d 1575, 1578 (Fed. Cir. 1990).)

Response to Arguments

Applicant's arguments filed 09/07/04 have been fully considered but they are not persuasive. As stated in the previous response to applicant's argument, Narwankar teaches a top conducting layer being annealed with oxidized gas. Alternatively, the top conducting layer may be a layer or two layers. Nonetheless, Narwankar discloses that the top conducting layer 608 becomes the annealed top conducting layer 610 after the top conducting layer 608 goes through the annealing step. Therefore, the rejection is proper.

As stated, the top layer 608 is annealed to become layer 610 as a result of the annealing step. Similarity to applicant's invention, as the top layer goes through the annealing step the result of the top layer is the same as the result of layer 610 of the '854 reference. Thus the annealed top layer 610 results in a capacitor structure with reduced capacitor current leakage.

Furthermore, Narwankar teaches that the annealed top layer 610 is different from layer 612, because layer 612 is not annealed. Thus in order to be different from layer 612, the top conducting layer 608 is annealed and layer 612 is not annealed.

With respect to applicant's contention that Narwankar '854 has more than one top layer. The examiner agrees that Narwankar has more than one top layer. However, Narwankar also teaches that the capacitor device may have one top conducting layer, as stated in col. 13, lines 24-26. Therefore, Narwankar's annealed top layer 610 meets the present claim limitation.

For the foregoing reasons, the above rejection is proper.

Conclusion

1. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Vikki Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Mr. Wael Fahmy, can be reached at (571) 272-1705. The office fax number is 703-872-9306.

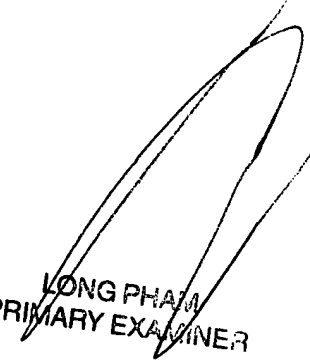
Any request for information regarding to the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspro.gov>. If you have questions pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Lastly, paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for

Art Unit: 2814

information on this policy. Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

Vikki Trinh,
Patent Examiner
AU 2814



LONG PHAM
PRIMARY EXAMINER